

**Bilingual Polytechnic Dictionary of Metaphors: Spanish to English**

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**Abstract**

This paper provides an overview of an ongoing research project work: “A Polytechnical Bilingual Dictionary of Metaphors: Spanish-English/English-Spanish” done by the UPM consolidated research group “DISCYT” (Estudios Cognitivos del Discurso Científico-Técnico). A detailed explanation of the method adopted to identify key metaphors collected from the different subject areas is included. Drawing from recognized empirical methods (Pragglejaz 2007, Cameron 2007, Steen 2007), the examples have been examined according to the main tenets of conceptual metaphor and conceptual integration theory (Deignan 2005, Gibbs 2008, Lakoff 1993, Lakoff & Johnson 1999, Steen 2007, Fauconnier & Turner 2008). This forthcoming dictionary comprises metaphors of over 10 scientific and technical areas such as Aeronautical engineering, Agronomy, Architecture, Biotechnology, Civil engineering, Geology and Mining, Mechanical engineering, Nanotechnology, Naval and Maritime engineering, Sports and Telecommunications. In this paper, we focus on the study of examples taken from civil engineering, materials engineering and naval engineering. Representative cases are analyzed from several points of view (multimodal metaphor, linguistic information strategies and translation into target language) highlighting cross linguistic variations between Spanish and English.

**Key Words:** Metaphor identification; Engineering Metaphor; Dictionary of Engineering Metaphors

**Resumen**

Este artículo presenta una panorámica del trabajo de investigación: “Diccionario Politécnico Bilingüe de Metáforas: Español-Inglés/ Inglés-Español” realizado por el grupo de investigación reconocido de la Universidad Politécnica de Madrid “DISCYT” (Estudios Cognitivos del Discurso Científico-Técnico). Incluye una pormenorizada explicación del método adoptado para la identificación de las principales

metáforas de las distintas áreas de conocimiento estudiadas. Partiendo de métodos empíricos conocidos (Pragglejaz 2007, Cameron 2007, Steen 2007), las unidades léxicas seleccionadas pasan por varios filtros de acuerdo con los principios de la metáfora conceptual y de la teoría de integración conceptual (Deignan 2005, Gibbs 2008, Lakoff 1993, Lakoff & Johnson 1999, Steen 2007, Fauconnier & Turner 2008). La primera parte del diccionario Español-Inglés, de próxima publicación, comprende metáforas que proceden de áreas científico-técnicas como la ingeniería aeronáutica, la agronomía, la arquitectura, la biotecnología, la ingeniería civil, la geología y la minería, la ingeniería mecánica, la nanotecnología, la ingeniería naval y marítima, los deportes y la telecomunicación. En este artículo, nos ocupamos del estudio de ejemplos tomados de la ingeniería civil, la ingeniería de materiales y la ingeniería naval. Los casos más representativos son analizados desde varias perspectivas (metáfora multimodal, estrategias de información lingüística y traducción en lengua meta) subrayando las variaciones observadas entre español e inglés.

**Palabras clave:** Identificación de la metáfora; Metáfora en la ingeniería; Diccionario de metáforas de la ingeniería

## Introduction

Lakoff and Johnson (1980) showed that metaphor works as a powerful cognitive tool in human thought and therefore it does not occur only in language. They also proved that conceptual mappings in metaphor are bodily grounded. This laid down the basis for the Conceptual Theory of Metaphor that has developed ever since (Lakoff 1987; Johnson 1987; Kövecses 2000; Lakoff and Johnson 1999; Lakoff and Nuñez 2000; Gibbs 2008). Although the idea of a metaphor dictionary is not new (Deignan 1995), a Spanish-English dictionary of metaphors in scientific and technical language can be considered challenging and groundbreaking, given the number of disciplines to be covered and the extent of the cross-linguistic analysis. In this respect, when evaluating the scope and potential usefulness for both academics and professionals, the contribution of experts in these specific fields was deemed essential and sought after. The dictionary includes the following disciplines, most of them within engineering fields: Aeronautical engineering, Agronomy, Architecture, Biotechnology, Civil engineering, Geology and Mining, Mechanical engineering, Nanotechnology, Naval and Maritime engineering, Sports and Telecommunications. In the opening Spanish-English volume, a team of linguistic scholars belonging to UPM research group DISCYT have worked to

pinpoint and cross-analyze over 8000 lexical items with frequent consultations with subject specialists. This paper examines a range of examples taken from Civil Engineering (CE) and Naval Engineering (NE). The procedure adopted for metaphor identification and the problems and solutions encountered are discussed in the sections below. In addition to previous known metaphor identification methods (e.g. The Metaphor Analysis Project, Pragglejaz group 2007), our approach was based on frequency of use, contextual clues and specialized and general dictionaries. For practical reasons, the variety of metaphorical cases gathered was structured and subsequently homogenized into a common system for all disciplines. Our main findings from a linguistic point of view are named below:

- (i) Given that metaphor is a cognitive mechanism that operates dynamically we have found not one but diverse layers of metaphORIZATION. Examples as *port*; *harbor*; *bridge* are polysemous words that depending on the context can appear in different strata of metaphORIZATION. We also examined the co-occurrence of metaphor and metonymy in a number of cases.
- (ii) Metaphor has a multimodal nature and therefore can appear in different scenarios activating various perception codes. This applies to conceptual, linguistic, or visual metaphor (Forceville 2010). To illustrate such representations, we have established the typology of “image metaphor” that basically triggers a visual image rather than the semantic network typical of conceptual metaphor.
- (iii) Metaphor is a cultural phenomenon and as such it has to be accommodated according to the language. For example, we have observed no systematic linguistic correspondence of Spanish into English or vice versa. The nature of mappings does fluctuate and metaphorical realizations in one language could be metonymic or plainly literal in the other.

### **Methods to identify metaphor**

Cameron in The Metaphor Analysis Project and the Pragglejaz group (2007) have proposed methods to identify linguistic metaphor. Both of them rely on contextual clues and the use of dictionary. Cameron differentiates between topic and vehicle, the latter bearing the metaphorical part and the former being the main theme of the text. Metaphors should satisfy two conditions: a contrast between the contextual meaning and the vehicle and a link between the contextual topic and the vehicle. Steen and the Pragglejaz group (2007) additionally recommend not to overlook the importance of collocates and historically older meanings. Neuman et al. 2013 point out that it is not easy to distinguish metaphorical from non-metaphorical language:

“the boundary between the denotational basic meaning of a phrase and its extended metaphorical sense is fuzzy”. (Neuman et al. 2013:2). Although linguistic metaphor is fairly common in technical language, this fact does not simplify its detection. In *auscultación*, from a hydraulics and construction context and collocating with *presas*, the metaphor seems clear because of its general medical sense, unusually applied to inert substances. This use involves a personification. Conversely, *rosa de los vientos* (from naval engineering), a direct visual image is basically involved and this typology was grouped under the label of “image metaphors”. In this respect, we endorse Neuman et al.’s criterion of “selectional preference” (Ib.: 3), according to which metaphor involves a violation of meaning, and it happens when the constraints of literal language do not pertain. For example, the lexical units *auscultación* and *fatiga* are associated for the non-engineering expert with the medical domain rather than with construction or hydraulics.

### **Procedure followed in the Polytechnic Dictionary of Metaphors: examples**

Besides the above mentioned methods, we have relied on word collocates and context information (written material taken from different academic and professional genres); expert advice (academics, engineers, etc.) and visuals (videos, photographs, field visits). The use of specialized and general dictionaries have also helped to determine the presence of metaphor. The use of these tools was rounded off with numerous expert consultations and discussions upon the selected material. Table 1 showcases levels of metaphORIZATION that were found. Given the fuzziness of meaning boundaries, these subdivisions are not clear-cut rather they respond to salience and operative reasons. Due to the fact that the part of the dictionary recently ended corresponds to Spanish-English, examples shown are in Spanish alongside their English equivalent. As can be seen, in most cases no direct matching from language to language can be established and a linguistic metaphor in Spanish can be a metonym in English. To characterize linguistic metaphor, collocational patterns and group clusters were particularly considered, for example *revestimiento* (CE) collocates with *túnel* (tunnel), and refers to a layer of cement that covers the tunnel walls. Similarly, *alma*, collocates with *viga* (beam) and represents its central part, while its English equivalent “web” involves another domain. *Seno de vela* (NE) in a literal sense calls to mind the curvature of a sail, but its English counterpart “belly” evokes a bodily part. Alternatively, image metaphor bolsters image formation rather than linguistic aspects. Examples of this metaphORIZATION can be found in table 1 with their English translations.

	Civil engineering	Naval engineering
Linguistic metaphor	<i>Pluma</i> (boom); <i>Cabeza de pilote</i> (pile cap); <i>Viga</i> (beam); <i>Alma (de viga)</i> (web); <i>Auscultación</i> (monitoring)	<i>Seno de vela</i> (belly); <i>Percha</i> (spar); <i>Nudo de rizo</i> (reef knot); <i>Madre</i> (stump); <i>Cabezada</i> (pitch)
Image metaphor (visual)	<i>Forjado en rosario</i> (string forging); <i>Aliviadero en forma de flor de campanilla</i> (morning glory spillway); <i>Armadura reforzada en x</i> ( x-braced frame);	<i>Ojo de buey</i> (bull's eye); <i>Rosa de los vientos</i> (wind rose); <i>Pie de gallo</i> (crowfoot); <i>Rascador de nubes</i> (moonraker)
Metonymy (Part/Whole; Cause/Effect)	<i>Presa de residuos</i> ( tailings); <i>Pala de cuchara</i> (scoop shovel); <i>Taza del vertedero</i> (bucket); <i>Cabeza de esclusa</i> (lockbay); <i>Tablero</i> (deck)	<i>Rizo de cabo</i> (reef line); <i>Rostro de espolón</i> (beak); <i>Perfil con bulbo</i> (bulb section); <i>Garganta</i> (swallow)
Metonymy - Metaphor Combination	<i>Luz (del puente)</i> (span); <i>Paramento de la presa</i> (apron); <i>Tacón de muro</i> (heel); <i>Oruga</i> (caterpillar)	<i>Hocicar</i> (to nose); <i>Entrañas</i> (del barco) (bowels); <i>Rompeolas</i> (breakwater)

Table 1. Layers of metaphorization

Metonymy combines meanings from the same semantic domain, one standing for the other (Roldán, Úbeda & Santiago 2009: 85). In our work, we found metonym frequently interacting and sometimes generating metaphor (Goossens 1995). Thus “tablero” refers to a roadway in bridges, but here the metonymy of a material (wood) is historically outdated because currently it is made of steel or concrete. In turn, the meaning in English “deck” evokes a ship’s surface. Some metaphoric examples are derived from a metonymy, such as *oruga* (caterpillar), a machine evocative of the shape and crawling movement of the insect (cause/effect). Although *luz* makes reference to the length of a bridge, a non-literal sense is also involved. The case of *entrañas* (bowels) (NE) can be understood as a metonymy within a metaphor (Deignan and Potter 2004:1241); the part/whole contiguity relation is subsumed with a non-literal sense designating the inner part of the ship where the engine room is located.

### Conceptual mapping diversity

Following conceptual metaphor theory we judged important to test out the embodied origin of the data. One of the main tenets of embodiment theory is that source domains have experiential basis and that target

domains are abstract as in the LOVE IS A JOURNEY metaphor (Lakoff and Johnson 1980). This implies unidirectionality and transferring features from bodily experienced source domains onto abstract target domains. Recent research discusses mapping unidirectionality claiming that source and target domains can vary and do not respond to a fixed pattern (Boeiblan forthcoming). Our data support this view, we identified a number of concrete onto concrete, abstract to abstract and sensorimotor experience-based mappings. Table 2 includes some examples from 32 conceptual mappings found in Spanish. The procedure followed consisted of first identifying lexical units as metaphoric and then analyzing them to determine if they were linguistic realizations of conceptual metaphor. Obviously, quite a few examples did not satisfy this condition. Although some mappings could be common in English, particularly those bodily grounded, others are language and culture specific.

Abstract onto abstract	<b>LAS TÉCNICAS DE INGENIERÍA CIVIL SON TERAPIAS</b> (CIVIL ENGINEERING TECHNIQUES ARE THERAPIES) (CE)	<i>auscultación; collarín; calzo; reforzar; armar; resistencia; escudo; inyección; armadura; red; rehabilitación; relajación de esfuerzos; renovación; reparación; sanear; drenaje; recubrimiento; resonancia; renovación; sanear; vida útil; forense; curación; estabilización; monitorización</i>
Concrete onto concrete	<b>EL AGUA ES UN CAMINO (WATER IS A PATH/WAY) (CE)</b>  <b>LOS BARCOS/ LAS MÁQUINAS SON PERSONAS</b> (SHIPS ARE HUMAN) (NE)  <b>LAS PARTES DE LAS ESTRUCTURAS SON HUMANAS</b> (PARTS OF BUILDING STRUCTURES ARE HUMAN) (CE)	<i>avenida; galería; vía; calle, tramo</i>  <i>buque gemelo; buque cabecea; cabeza; da una cabezada (pitching; plunging); aguja loca</i>  <i>alma; brazo; cabeza; cuello; mano; vesícula; uña; arteria; boca</i>

Based on sensorimotor experience	<b>FUNDIR/TRATAR METALES ES COCINARLOS</b>  (TREATING METALS IS COOKING THEM) (CE/NE)	<i>Recocido (annealing: se calienta y enfría lentamente); revenido (tempering: tratamiento para aumentar su temple); endurecido (hardened); reblandecimiento; costra superficial; baños; pan de fangos; acero crudo; pan de oro o de plata; plomo agrio; plomo dulce; embutir; acero dulce; acero al horno; hierro colado; cobre frito; horno; fundir</i>
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Table 2. Examples of Spanish conceptual mappings

The mapping typology mentioned above has been applied as shown in table 2. In the case of concrete onto concrete mapping, the domain of water is understood in terms of a path or a way; ships (an artifact made by humans) are understood as human beings and similarly parts of structures are put in human terms. The mapping TREATING METALS IS COOKING THEM compresses two sensorimotor experiences both arising from cause/effect action in the human sphere. On the contrary, relatively abstract realizations such as therapies choice and repairing techniques are mapped in CIVIL ENGINEERING TECHNIQUES ARE THERAPIES. Fauconnier and Turner (2002, 2008) have proved in conceptual integration theory that the emergent structure that ensues from mapping interactions is cognitively more powerful than input domains (Fauconnier and Turner 2002, Fauconnier and Turner 2008). In this sense, the mapping CIVIL ENGINEERING PROBLEMS ARE MEDICAL PROBLEMS forms part and is embedded in the abovementioned CIVIL ENGINEERING TECHNIQUES ARE THERAPIES network. This network sustains important concepts and linguistic realizations branching civil engineering communication.

### Cross-linguistic differences

Due to lack of cross-linguistic correspondence in English and Spanish, we met further lexical difficulties. For example one lexical term in Spanish could have 3 different realizations in English as shown below in figure 1.



Figure 1. Cross-linguistic correspondence (E-Sp)

This phenomenon seems to respond to cross-cultural reasons, given that English discriminates this concept according to the situation where it takes place. For example “fretting” is used for highways, “scabbing” for walls and “cracking” is more general for beams, concrete, metals, etc. In Spanish where precision is needed, a periphrasis is employed as in *fisuración de vigas*. In the example below represented in figure 2, a series of semantically linked lexical units *asentamiento*; *silla*, “seating” and “chair” needed to be contextualized to ascertain their meaning nuances. They share the common semantic domain “supporting a structure”.

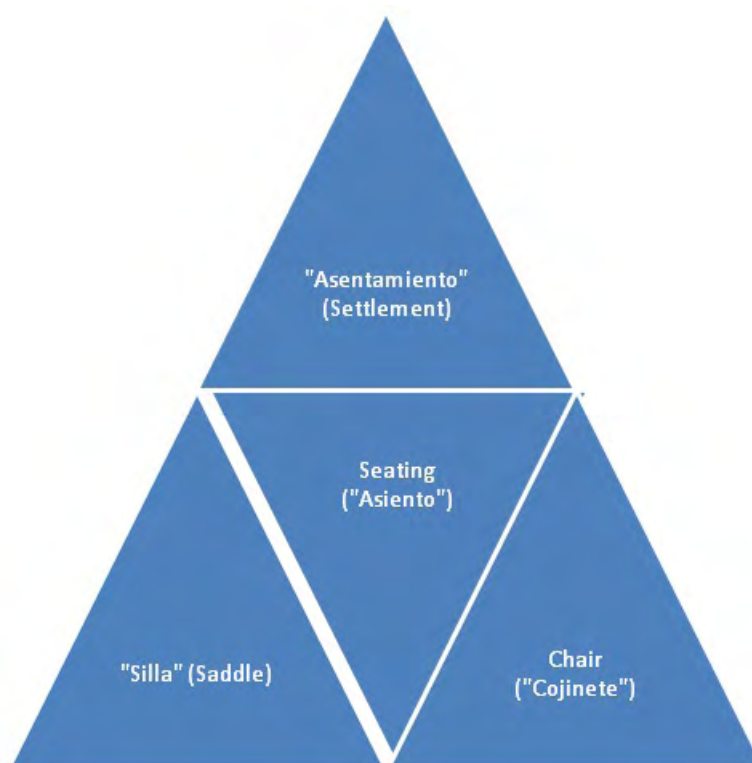


Figure 2. Cross-linguistic correspondence Sp-E



*Asentamiento* is contextualized as the vertical movement of the base of a structure and hence translated into English as “settlement”. “Seating” refers to a surface carrying a large load, being equivalent to *asiento*. Conversely, *silla* is used in a suspension bridge scenario and its English counterpart is saddle. “Chair” appears in a railways context as a steel fastener between a rail and a sleeper and corresponds to *cojinete*. As we can see, context, and situational cultural factors help to clarify related semantic senses. This also proves the role of language specific metaphor (Deignan 2004: 1232).

## Conclusions

This paper has intended to show the ins and outs of identifying metaphor during the preparation of a Spanish/English polytechnic dictionary of metaphors. The followed method entails word usage, contextual evidence, linguistic data and expert advice. Decisions about layers of metaphorization in lexical units were made according to linguistic and cultural variation. We have observed that conceptual mappings in English and Spanish are dissimilar, although bodily grounded mappings do appear in both languages. Image metaphor is highly frequent in both languages and metonym and metaphor are often combined and their boundaries blurred. It is expected that the second part of this study (English/Spanish volume) will shed further light on the use of non-literal language in engineering and other specialized disciplines.

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